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NLS2004049

April 1, 2004

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Subject: Licensee Event Report No. 2003-004-01
Cooper Nuclear Station, NRC Docket 50-298, DPR-46

The purpose of this correspondence is to forward a Licensee Event Report supplement.

Sincerely,

K V Chambliss for

John Christensen
Plant Manager

/dwv
Enclosure

cc: Regional Administrator
USNRC - Region IV

Senior Project Manager
USNRC - NRR Project Directorate IV-1

Senior Resident Inspector
USNRC

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The following table identifies those actions committed to by Nebraska Public Power District (NPPD) in this document. Any other actions discussed in the submittal represent intended or planned actions by NPPD. They are described for information only and are not regulatory commitments. Please notify the Licensing & Regulatory Affairs Manager at Cooper Nuclear Station of any questions regarding this document or any associated regulatory commitments.

COMMITMENT	COMMITTED DATE OR OUTAGE
Replace the low pressure turbine rotors with new rotors	RE22

NRC FORM 366 (7-2001) U.S. NUCLEAR REGULATORY COMMISSION	APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004
LICENSEE EVENT REPORT (LER) (See reverse for required number of digits/characters for each block)	Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC

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4. TITLE
Manual Reactor Scram Due To Main Turbine High Vibration

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
05	26	2003	2003	– 004 –	01	04	01	2004	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE	1
10. POWER LEVEL	089

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

	20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)
	20.2201(d)		20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)
	20.2203(a)(1)		50.36(c)(1)(i)(A)	x	50.73(a)(2)(iv)(A)		73.71(a)(4)
	20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)		50.73(a)(2)(v)(A)		73.71(a)(5)
	20.2203(a)(2)(ii)		50.36(c)(2)		50.73(a)(2)(v)(B)		OTHER Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50.73(a)(2)(v)(C)		
	20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)		
	20.2203(a)(2)(v)		50.73(a)(2)(i)(B)		50.73(a)(2)(vii)		
	20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)		
	20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)		

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Paul Fleming, Licensing and Regulatory Affairs Manager	(402) 825-2774

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
X	TA	TRB	W120	Y					

14. SUPPLEMENTAL REPORT EXPECTED				15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO				

16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On May 26, 2003, at 1321 hours, there was a step change in main turbine vibration indication from less than 4 mils to 10.2 mils. A manual reactor scram was initiated from 89% power. Subsequent to the scram, reactor vessel water level dropped to approximately 30 inches below instrument zero, resulting in Primary Containment Isolation System Group 2, 3, and 6 isolations, start of High Pressure Coolant Injection and Reactor Core Isolation Cooling systems, and trip of the Reactor Recirculation pumps. An evaluation of plant response determined all control rods fully inserted and systems controlling reactor pressure and level responded as designed.

The most probable cause for the turbine blade failure in the low pressure turbine is material condition. The failure mechanism is consistent with age-related/end-of-life type failures. Long term corrective action will be to replace the low pressure turbine rotors with new rotors during the next refueling outage.

Immediate actions taken were to manually scram the reactor, trip the main turbine, and place the unit in a cold shutdown condition. An initial visual exam of the turbine blade root specimen was obtained, which concluded the crack is consistent with high cycle fatigue. Magnetic particle and eddy current testing were performed on both faces of the last four rows on both LP1 and LP2 spare rotors. Blades with crack indications on the spare rotors were replaced. The in-service LP1 and LP2 rotors were replaced with the spare rotors.

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17. NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)*

PLANT STATUS

Cooper Nuclear Station (CNS) was in Mode 1 (Run) at 89% power at the time of the manual reactor scram. Reactor power had been lowered from 100% in response to a main turbine high vibration.

BACKGROUND

The CNS turbine (EIIS:TRB) is an 1800 revolution per minute tandem-compound, non-reheat unit with 44-inch last stage blades. It consists of a double flow high pressure turbine and two double flow low pressure turbines. There are nine stages in the high pressure turbine and nine stages in each low pressure turbine. Exhaust steam from the high pressure turbine passes through moisture separators (EIIS:SEP) before entering the two low pressure turbines.

EVENT DESCRIPTION

On May 26, 2003, at 1321 hours, there was a step change in main turbine vibration indication (EIIS:VI) from less than 4 mils to 10.2 mils on the number five bearing. The Control Room indications were validated to be true with the locally installed monitoring system. A controlled shutdown to less than 25% power was unsuccessful as the bearing vibration slowly increased as power was reduced. The reactor was manually scrammed at 1727 hours followed by the manual trip of the main turbine. Maximum vibration indicated prior to the turbine trip was 12.3 mils.

Subsequent to the scram, reactor vessel water level dropped to approximately 30 inches below instrument zero, resulting in Primary Containment Isolation System Group 2, 3, and 6 isolations (EIIS:JM), start of High Pressure Coolant Injection (HPCI) (EIIS:BJ) and Reactor Core Isolation Cooling (RCIC) (EIIS:BN) systems, and automatic trip of the Reactor Recirculation pumps. An evaluation of plant response determined all control rods fully inserted and systems controlling reactor pressure and level responded as designed.

With no Reactor Recirculation pumps in-service, flow of cold water from the Control Rod Drive system and from reactor feedwater collected in the bottom head region. The cold water influx caused the bottom head region of the reactor to cool rapidly. This resulted in the reactor vessel drain temperature lowering from 389 degrees Fahrenheit to 279 degrees Fahrenheit during a one hour period, exceeding the 100 degrees per hour Technical Specifications cooldown limit. With the lower head cooling at a higher rate than the saturation temperature of the reactor pressure vessel, the Technical Specifications pressure-temperature curve was also exceeded for temperatures in the lower head region. Reactor pressure was lowered to restore plant parameters within the limits of the pressure-temperature curve.

At 2340, on May 26, 2003, the operators commenced slowly raising reactor water level to promote natural circulation. At approximately 0330 on May 27, 2003, as water level reached 48 inches above instrument zero, natural circulation started causing a heatup of the bottom head. The bottom head metal temperatures rose from 137 degrees Fahrenheit to 242 degrees Fahrenheit in a one hour period exceeding the Technical Specifications limit of 100 degrees per hour. The heatup rate limit for the bottom head drain temperature was subsequently exceeded at 0625 when Shutdown Cooling was placed in service. The drain temperature rapidly went from 109 degrees Fahrenheit to 279 degrees Fahrenheit.

An engineering assessment of the thermal transients and exceeding the Technical Specifications pressure-temperature limits demonstrates that adequate structural integrity is maintained for the reactor pressure vessel. Supporting stress and fatigue analyses show the fatigue impact of the scram event is not significant.

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17. NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)*

The HPCI and RCIC actuations, and Reactor Recirculation pump trips occur at the Level 2 Technical Specifications setpoint of 42 inches below instrument zero. A review of the setpoint calculation determined that the actual trip point of the related instruments could be lowered while still maintaining adequate margin to the Technical Specifications setpoint based on the approved setpoint methodology for CNS. Lowering the setpoint reduces the probability of a loss of forced circulation in the reactor vessel and challenges to safety systems if a similar event were to occur in the future. Prior to plant startup from the forced outage, the settings of the instruments related to the Level 2 setpoint were adjusted from 25.59 inches below instrument zero to 33.43 inches below instrument zero.

BASIS FOR REPORT

This event is reportable in accordance with 10 CFR 50.73(a)(2)(iv)(A) as "any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B) of this section." The following systems from paragraph (a)(2)(iv)(B) actuated during this event: Reactor Protection System, HPCI, RCIC, and Containment Isolation System Groups 2 and 6.

CAUSE

The most probable cause for the turbine blade failure in the low pressure turbine is material condition. The failure mechanism is consistent with age-related/end-of-life type failures. Long term corrective action will be to replace the low pressure turbine rotors with new rotors.

SAFETY SIGNIFICANCE

The May 26, 2003, scram and the associated plant and operator responses fall within the bounds of CNS probabilistic risk assessment transient initiator T3A. The T3A transient scenario contains the following sequence of events:

> This transient occurs when the reactor scrams due to various trips such as manual scram, turbine-generator trip or other automatic trip signals without a loss of offsite power. This transient does not result in an immediate loss of the condenser as a heat sink but can cause trip of the feedwater system. The feedwater system can be restarted once the trip signal is removed.

The risk significance of this event does not significantly affect the CNS risk as described by the probabilistic risk assessment and established by the baseline reliability of equipment or systems. The use of the condenser as a heat sink during shutdown was not affected by the event and the actual damage was limited to the main turbine components. The risk is considered to be much less than the 1E-06 threshold for risk significant changes in core damage frequency. The condition does not challenge a fuel, reactor coolant pressure, primary containment, or secondary containment boundary. The condition does not impact the plant's ability to safely shutdown or maintain the reactor in a safe shutdown condition. The plant was not placed in an unanalyzed condition nor was there any impact on compliance to plant license or design requirements for safety functions or important to safety component functions. Consequently, the safety significance of this event is very low.

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17. NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)*

CORRECTIVE ACTIONS

Immediate Actions:

1. Manually scrammed the reactor, tripped the main turbine, and placed the unit in a cold shutdown condition.

2. Obtained initial visual exam of the blade root specimen, which concluded the crack is consistent with high cycle fatigue.

3. Performed magnetic particle and eddy current testing on both faces of the last four rows on both LP1 and LP2 spare rotors.

4. Replaced blades with crack indications on the spare rotors.

5. Replaced the in-service LP1 and LP2 low pressure rotors with the spare rotors.

Long Term Actions:

Long term corrective action will be to replace the low pressure turbine rotors with new rotors during the next refueling outage.

PREVIOUS EVENTS

There have been no recent reportable events related to turbine vibration at CNS. LER 2003-003 documents exceeding the Technical Specifications heat-up rate limit. LER 94-015 documents excessive heat-up and cooldown rates during stratification events.